Vancouver Island Generation Project

Workshop 1

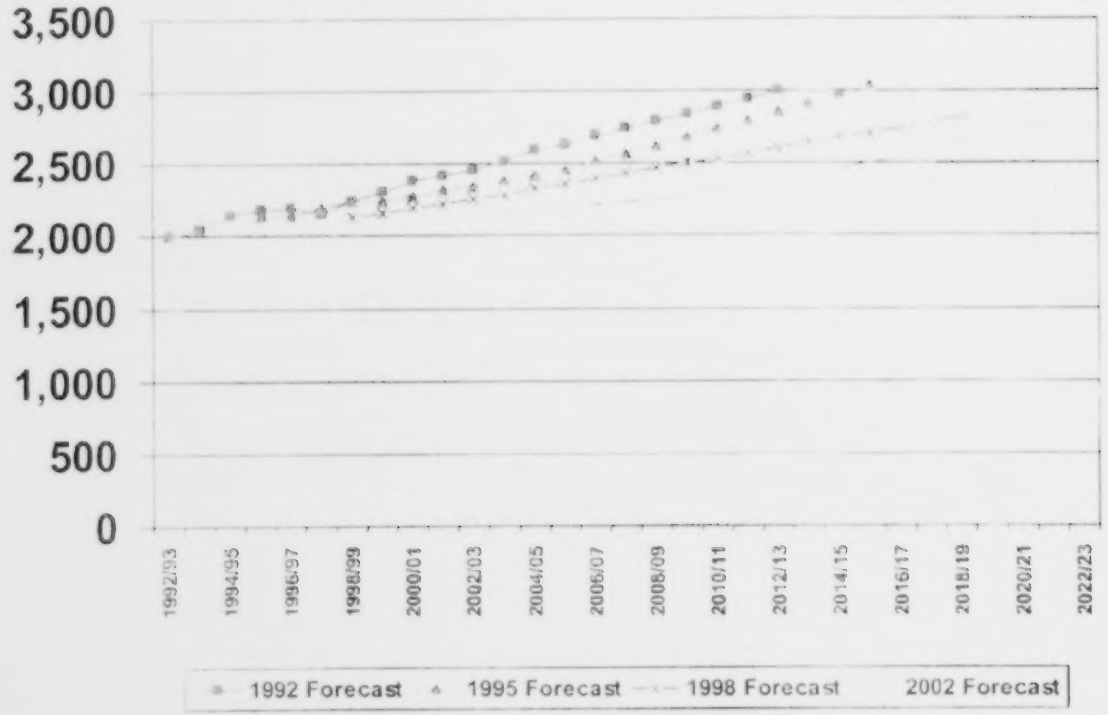
Vancouver Island Peak and Annual Demand and Supply

April 22, 2003

BC hydro

Supplementary Slides To Workshop Request

Vancouver Island Load Forecast (with losses)



Supplementary Slides To Workshop Request

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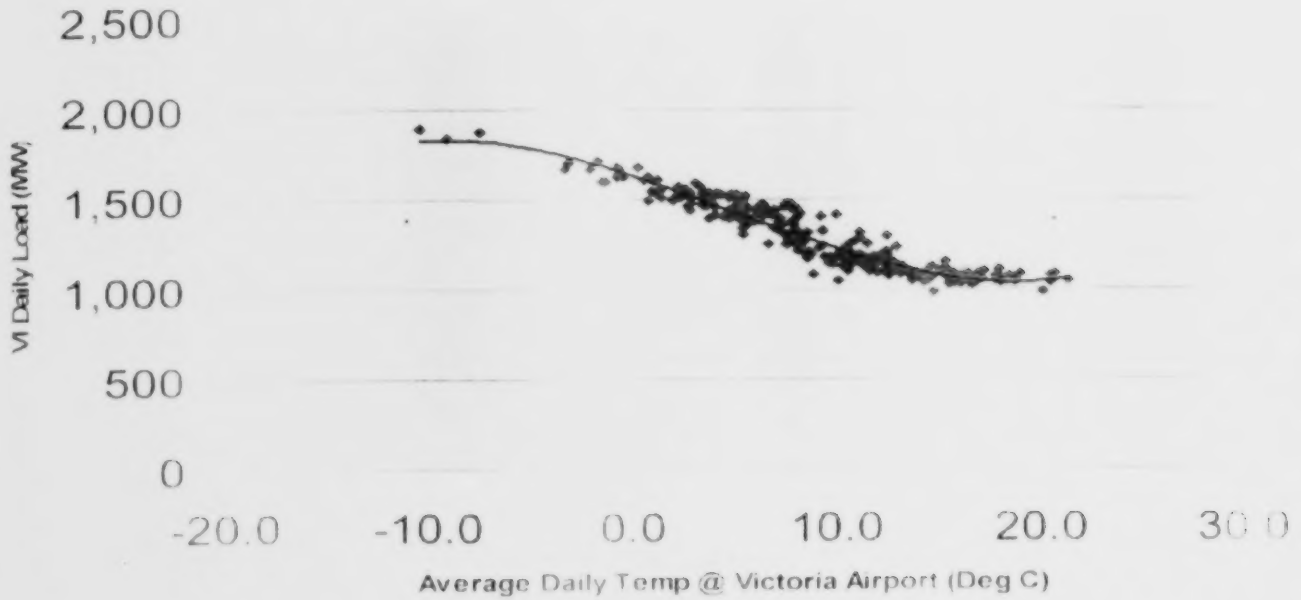
Vancouver Island Weather Sensitivity



Key Themes

- Peak demand, not annual energy use is the key concern
- Expected retirement of High Voltage Direct Current system in 2007 creates a shortfall in dependable capacity
- Vancouver Island peak demand growing
  - 32 MW/year (1.4 % per year) before Power Smart
  - 20 MW/year (1% per year) with Power Smart
  - About 1/3 of future growth to be met with Power Smart
- New resources ares required

Outline

- Introduction
- Vancouver Island Peak & Annual Demand
- Vancouver Island Existing & Committed Supply
- Conclusions

Approach to Electricity Planning

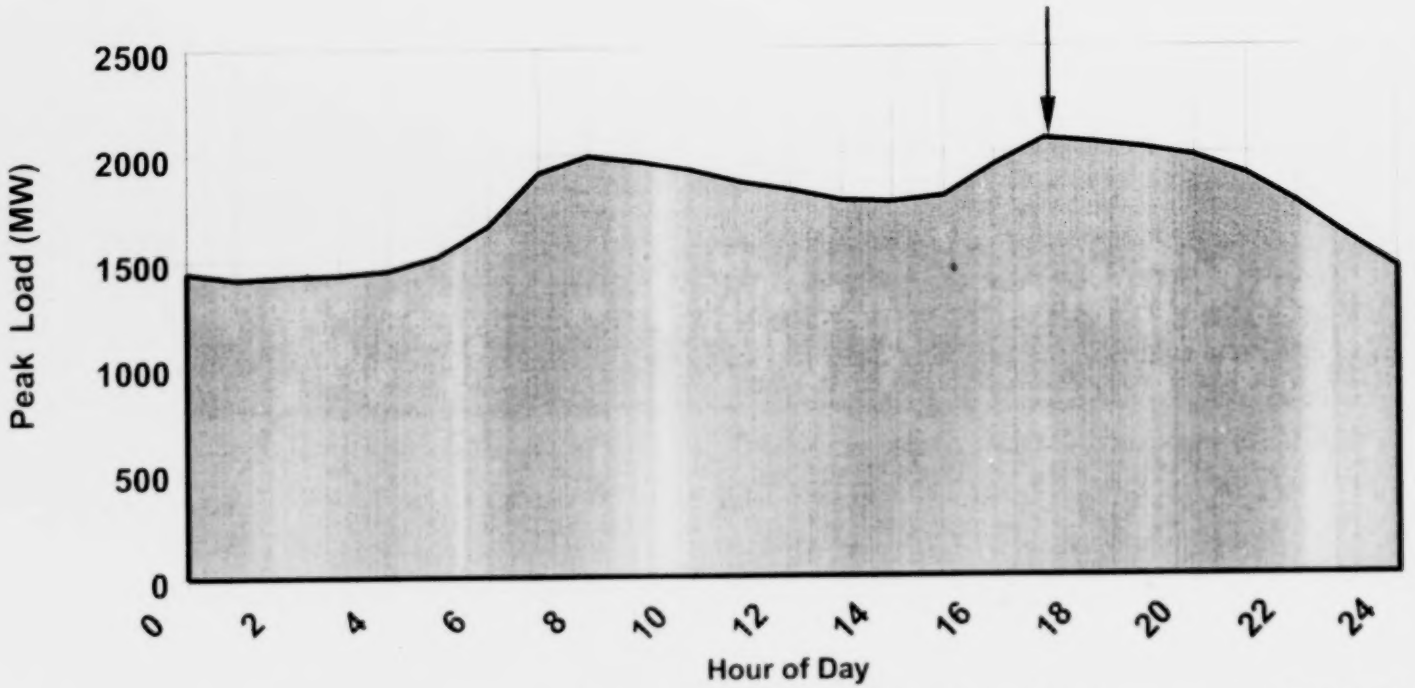
- Obligation to reliably serve customers
- Minimize cost while balancing environmental and social objectives
- Plan to industry reliability standards (single contingency)

Capacity and Energy

- Capacity - "the instantaneous peak demand for electricity". On Vancouver Island this would typically occur on a cold business day in the winter in the late afternoon.
- Energy - the cumulative amount of electricity consumed over a period of time; usually measured over a year.

Vancouver Island Peak Day Load Profile

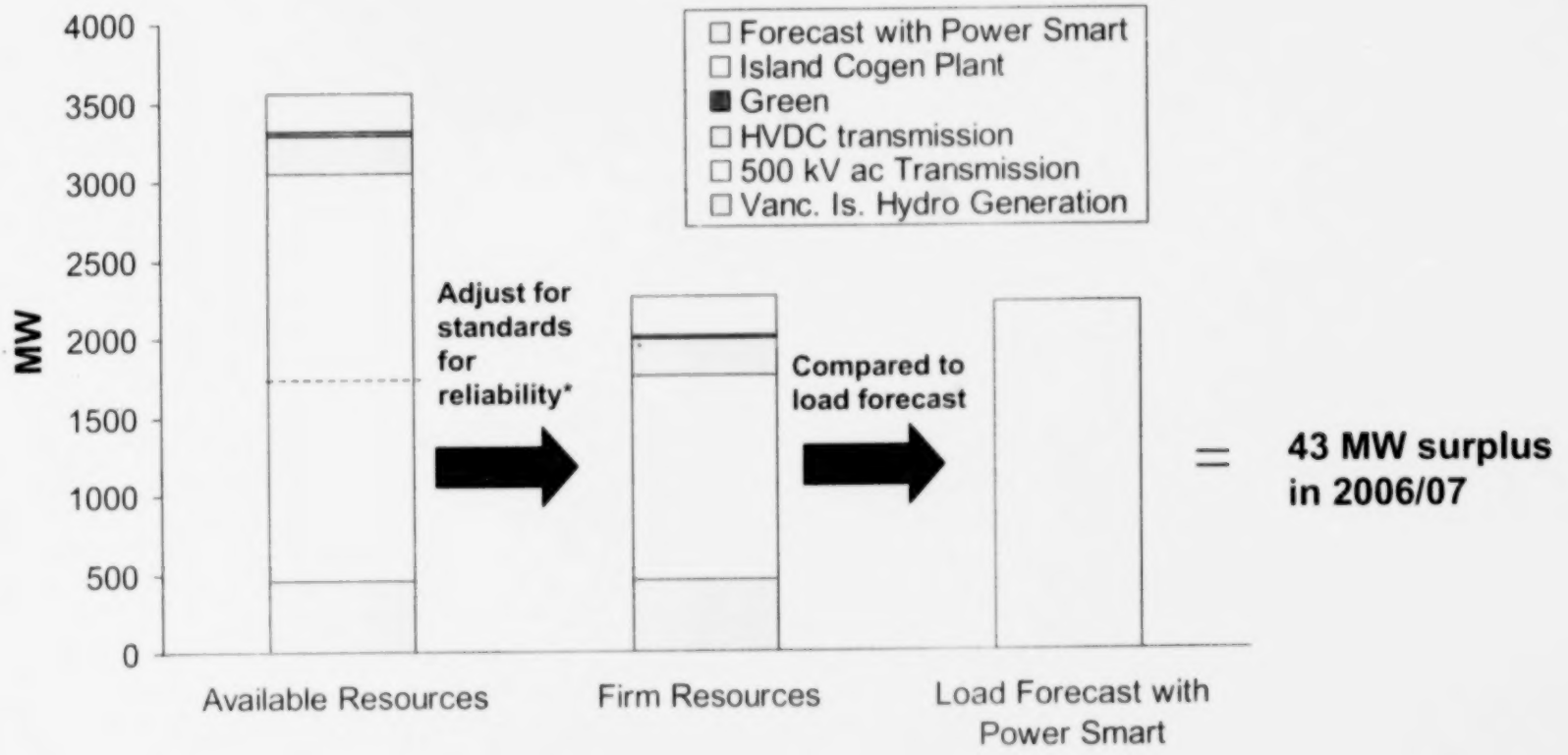
*Capacity = Peak load = 2065 MW**



Energy = area of under the curve = 42 GWh

* December 11, 2000 (maximum peak to date) including losses

Design for Industry Standards for Reliability



* One 500 kV AC circuit out of service to meet reliability guidelines.

Vancouver Island Peak & Annual Demand

Peak Demand Considerations

- Economic & Population Trends
- Forecast Inputs, Process, Methodology
- Peak Demand is Driven by Distribution Load
- Winter Temperature
- Rates
- Power Smart Savings
- Forecast Compared to Weather Adjusted Actuals
- Vancouver Island Forecast

Economic And Population Trends

For British Columbia

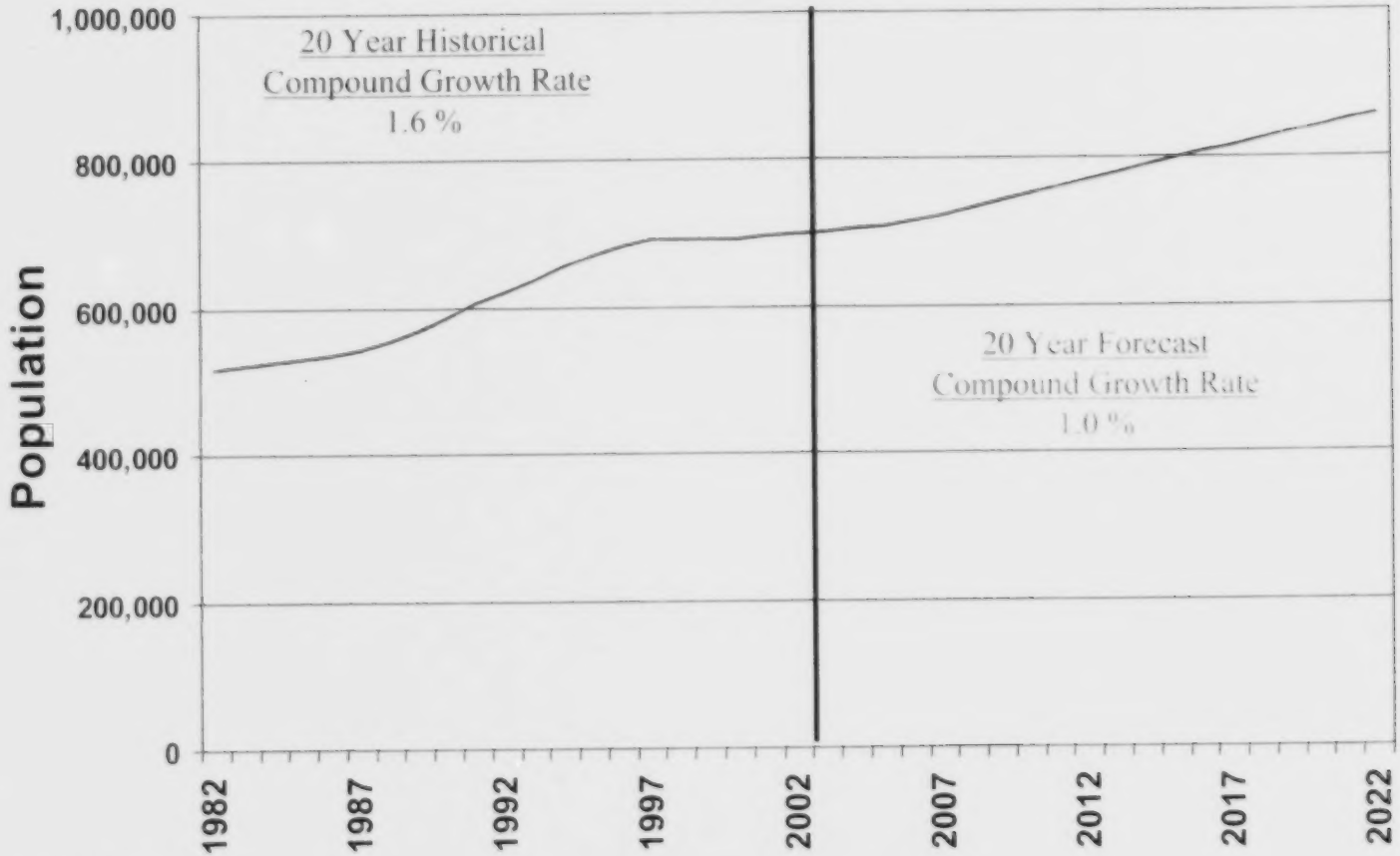
- Population forecast to increase faster than Canadian average
- BC to benefit from proximity to the Pacific Rim
- Minimum increases in industrial electricity demand
- More support services due to increasing business activities and population

Economic And Population Trends

For Vancouver Island

- Attractive to retirees
- Projected increases mainly from customers served at distribution voltages
- "Spiky" winter load in cold temperatures - 40% of residential customers have electric heating

Vancouver Island Population

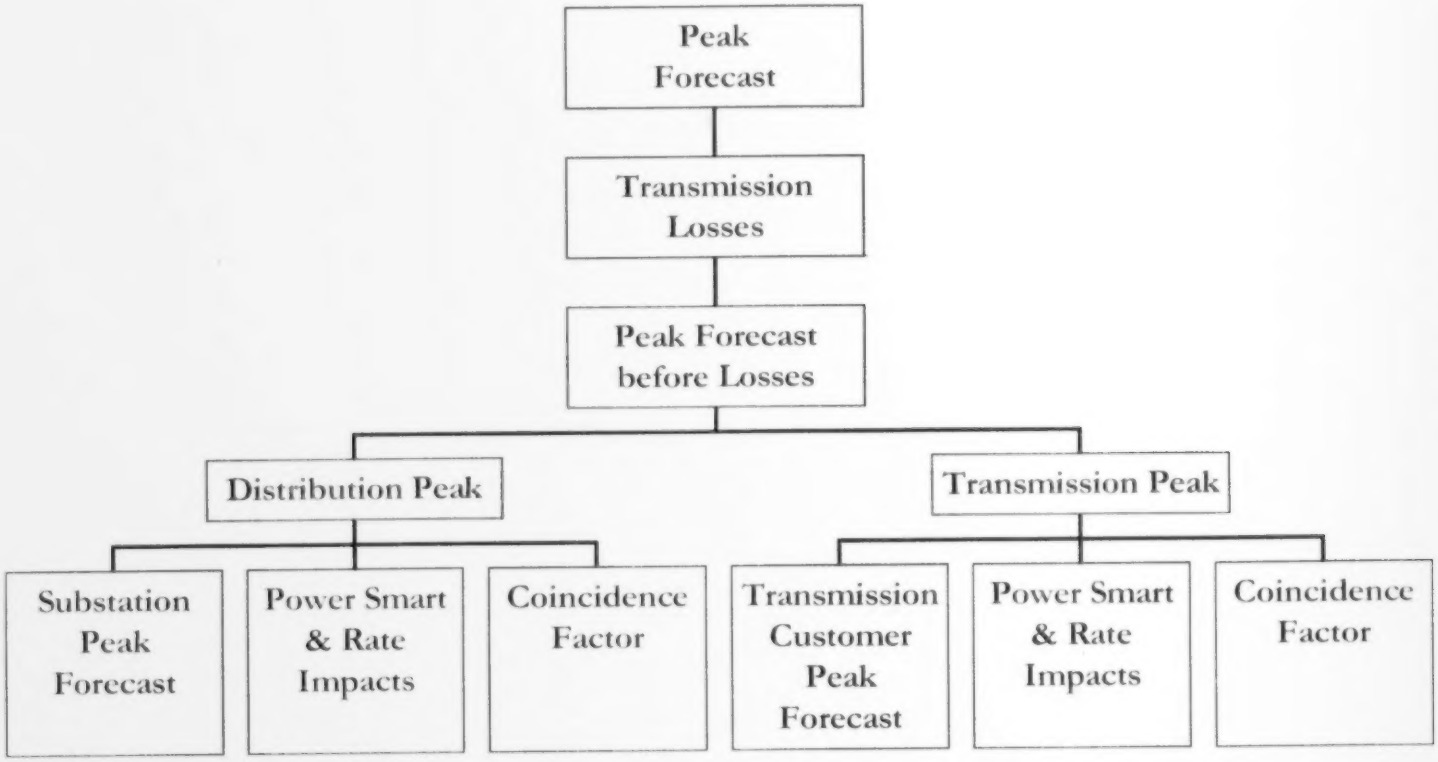


Source: BC Stats.

Forecast Inputs

Economic Forecast	Economic Assumptions Regional Economic Outlook	BC Ministry of Finance RA Malatest Economic Consultant
Distribution Forecast	Population Housing starts, Employment, Floor Stock	BC Stats RA Malatest Economic Consultants
Transmission Forecast	Forestry Outlook Pulp and Paper Outlook Mining Industry Outlook Chemical Industry Industrial Plans	AMEC Forest Industry Consulting NLK Consultants Inc. DI Farrell Mining Consultant Temanex Consulting Inc. Key Account Managers, BC Hydro
General Input	Major projects inventory Temperature statistics	BC Stats Environment Canada
Energy Intensities	End use surveys Residential and Commercial Pulp and Paper Other Industrial sectors	BC Hydro Marbek Resource Consultants and other external sources Temanex Consulting Inc. External consultants

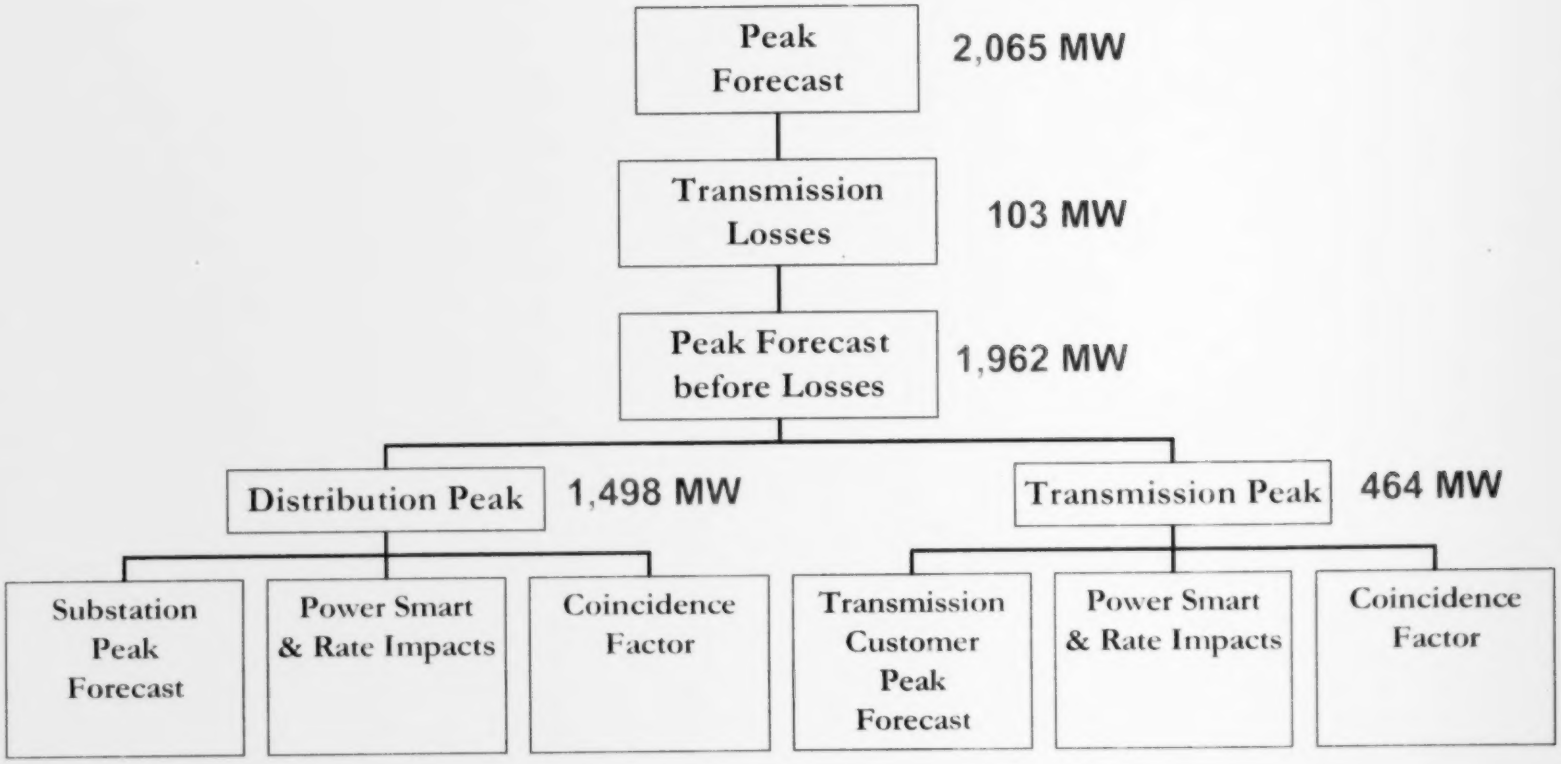
Vancouver Island Peak Forecast Process



Customers Served at Transmission Voltage on the Island (2002)

- Avenor - Gold River
- Department of National Defense - Esquimalt
- Doman Industries - Port Alice & Tahsis
- Nexen Chemicals - Nanaimo
- Norske Skog Canada - Crofton, Elk Falls & Port Alberni
- Pope & Talbot - Harmac
- Weyerhaeser - Nanaimo

Vancouver Island Peak - December 11, 2000



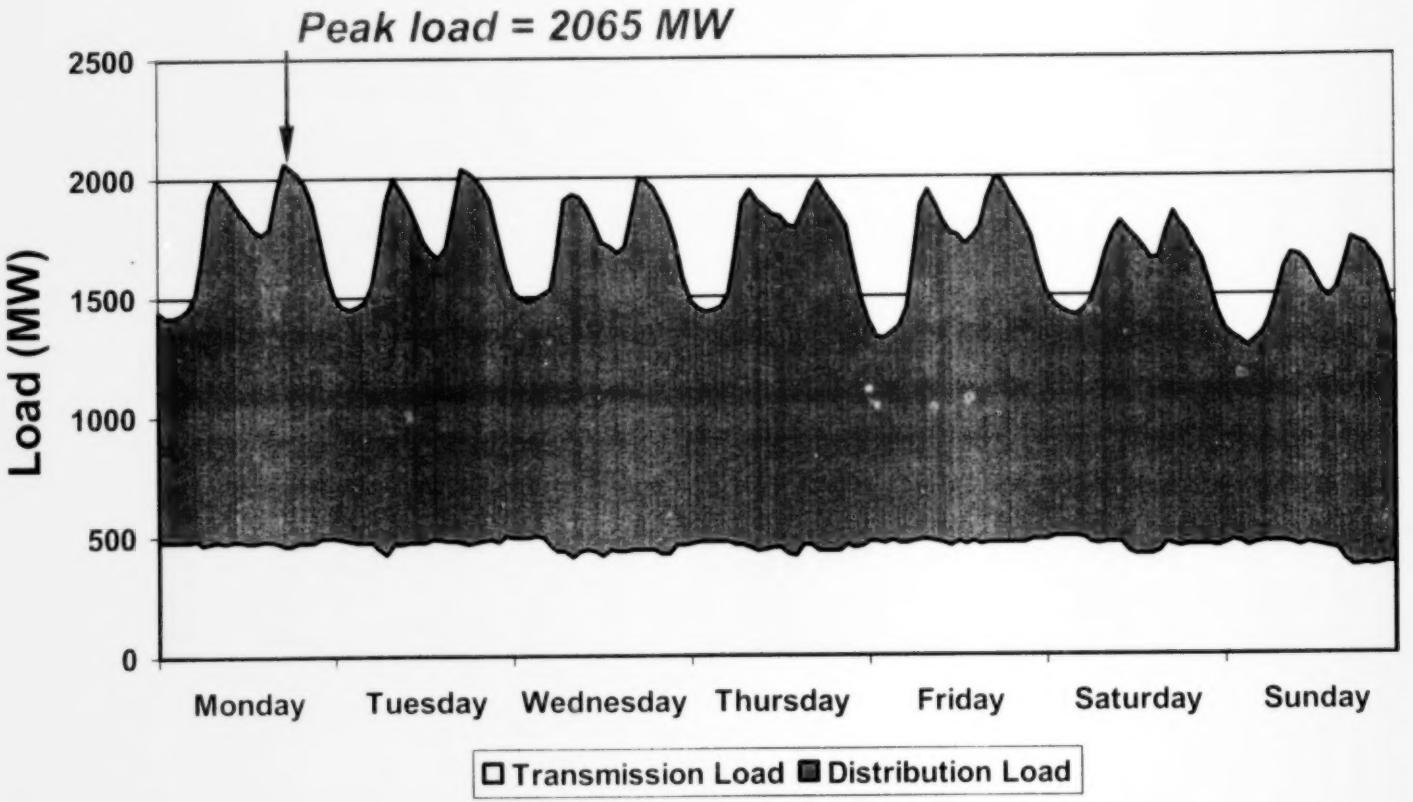
Distribution Peak Forecast Methodology

Framework	Stock	x	Intensity	= Demand
Drivers	**Economics** **Population** **Demographics**		**Technology** **Behavior** **Energy Prices**	
Definition	**Stock is the forecast of different types of residential housing units and employment**		**Intensity is an estimate of the peak demand per unit of stock**	
Example	**In an area with 1,000 electric-heated homes**		**Intensity is 4 kW per electric heated home**	**4,000 kW (4 MW)**

For each housing type and employment the above framework is used and then summed.

Vancouver Island Peak Demand is Driven by Distribution Load

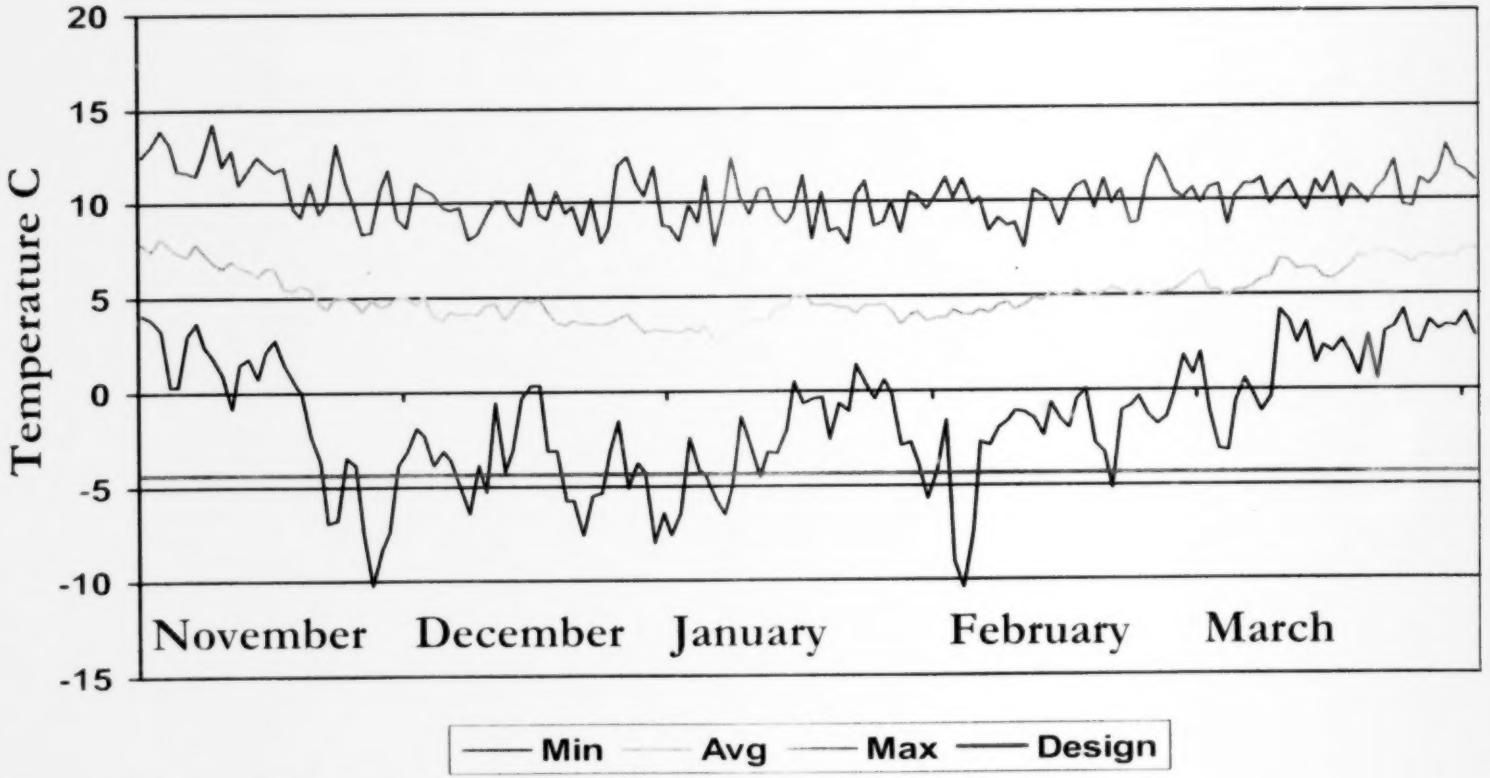
(Week of December 11, 2000)



Winter Temperatures

*(at Victoria International Airport)**

Design temperature for Vancouver Island is -4.4 C



*based on records for 39 years

Weather Adjustment to Actual Peak

- Plan for design temperature of -4.4 C (at Victoria Airport)
- Actual demand must be temperature adjusted for comparison

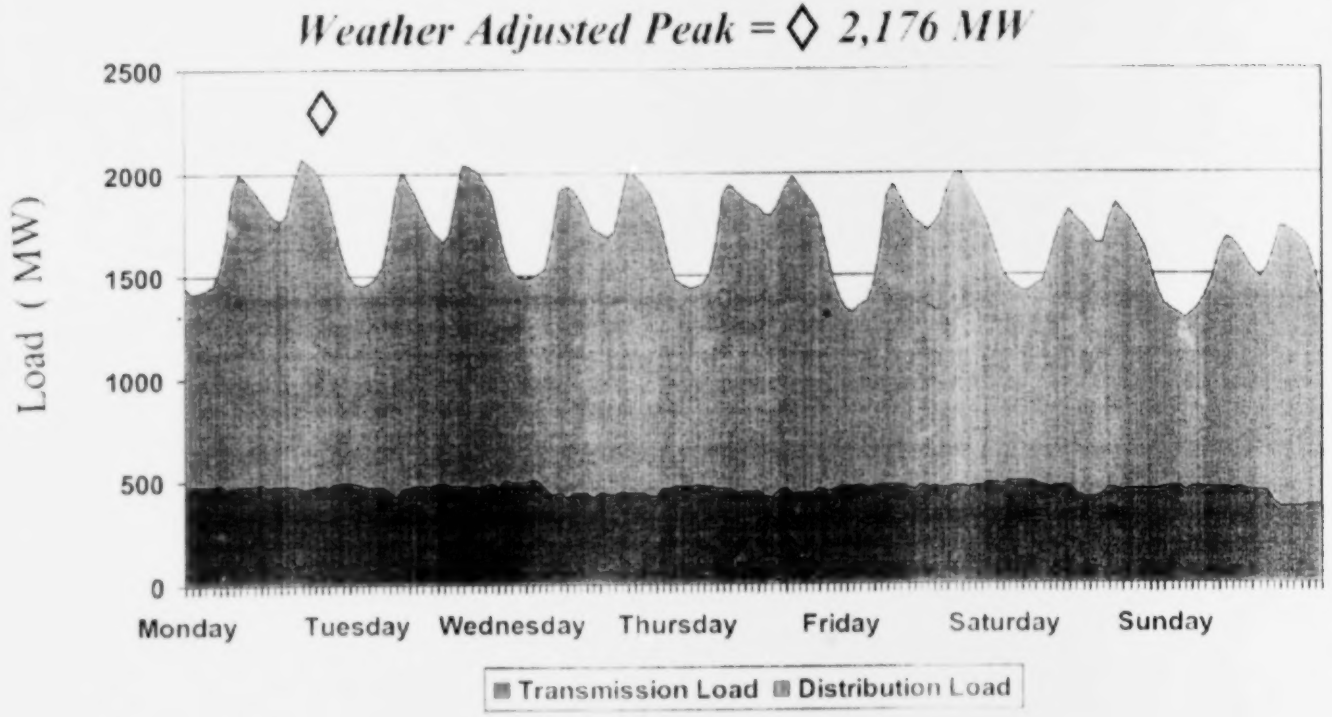
VANCOUVER ISLAND PEAK DEMAND

	Actual Peak (MW)	Adjusted Actual Peak (MW)
1990/91	2,077	1,961
1995/96	2,077	2,048
2000/01	2,065	2,176

Note:
Actual and adjusted Peaks includes
Distribution losses and Transmission losses

Vancouver Island Weather Adjusted Peak

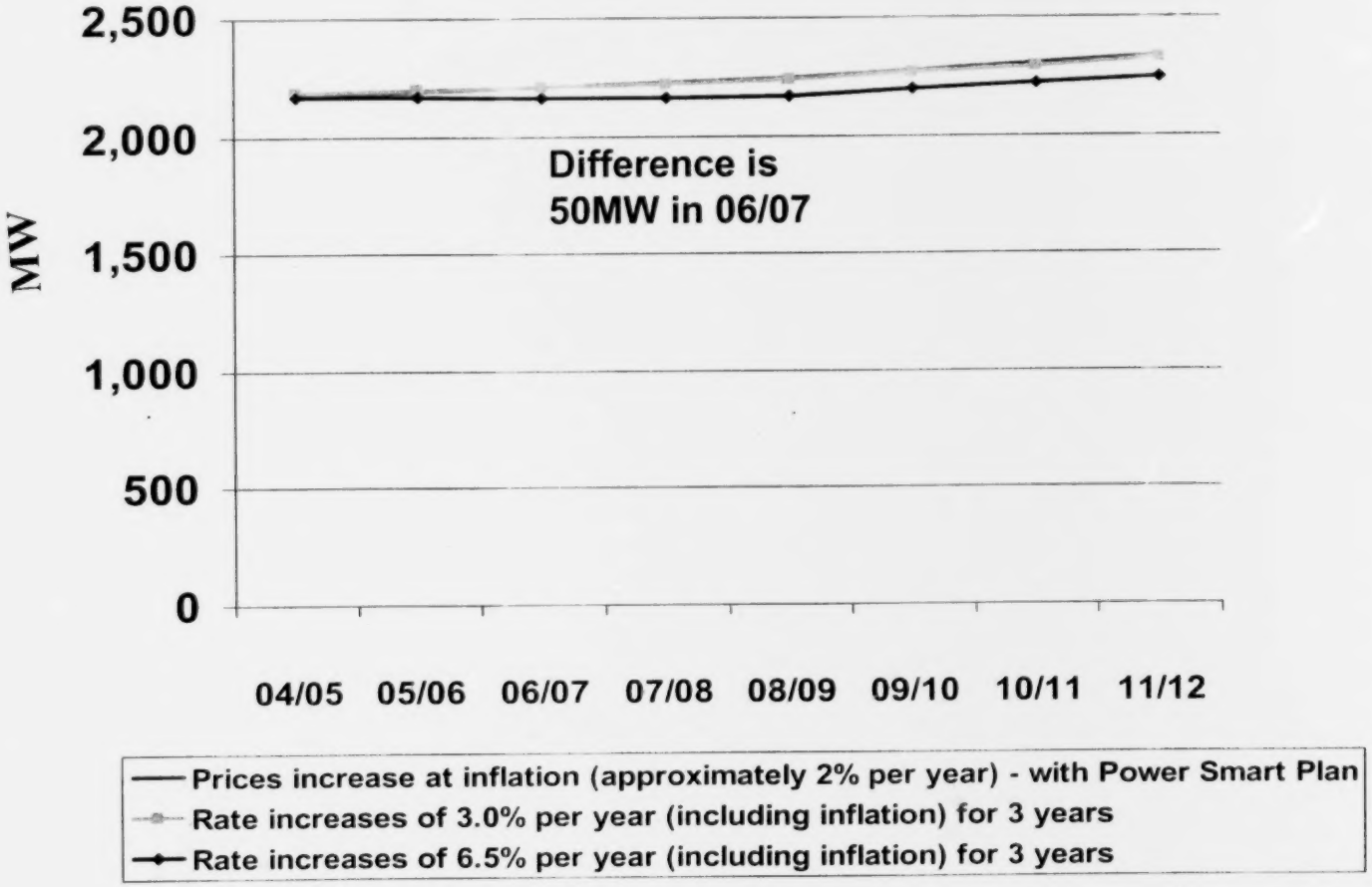
(Week of Dec 11, 2000)



Rates

- December 2002 forecast assumed electricity prices increase at the rate of inflation (approximately 2% per year)
- BC Hydro's February 2003 Service Plan estimates rate increases of 3.0% to 6.5% per year (including inflation) over the 3 year planning period

Estimated Impact of Rate Increases



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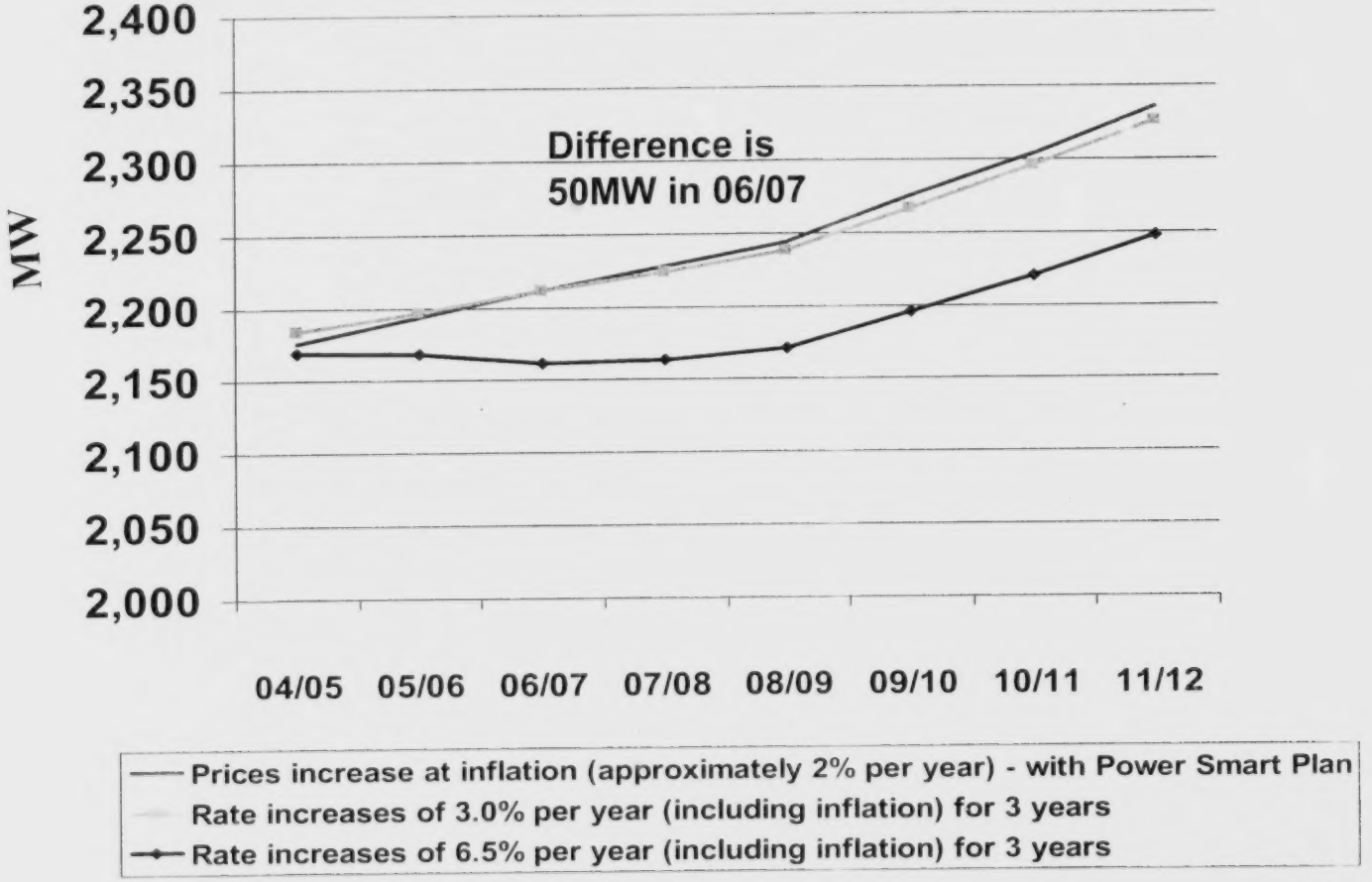


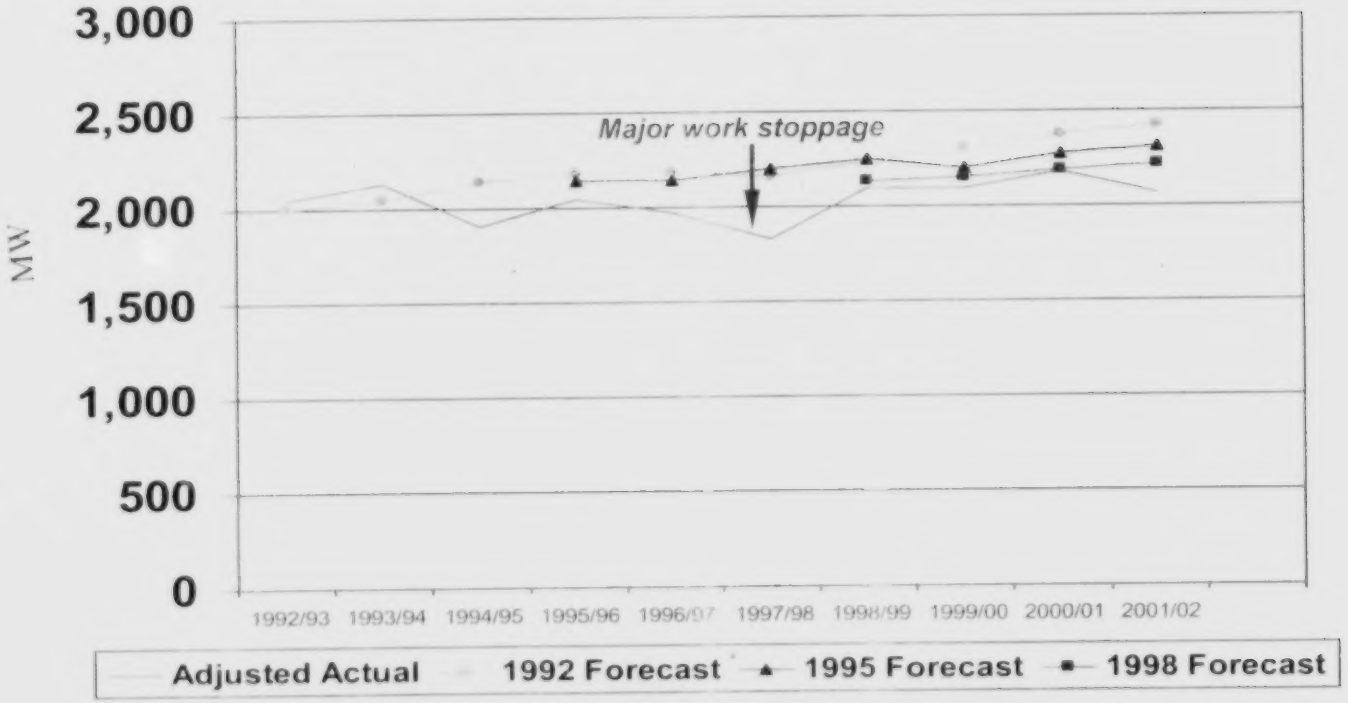
Power Smart Savings

- BC Hydro is investing $120 Million on Power Smart for Vancouver Island over the next ten years to achieve these savings

Vancouver Island Capacity Savings

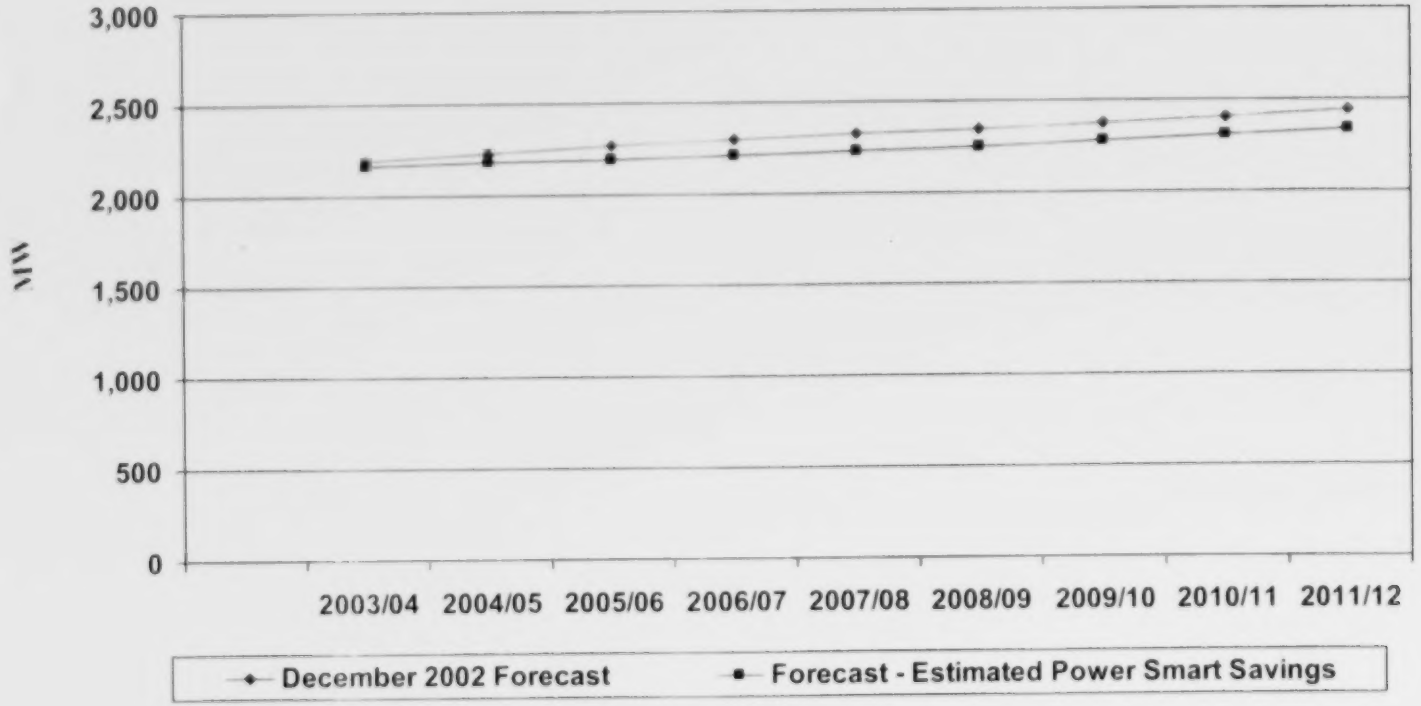
Fiscal Year	Savings MW
2002/03	7
2003/04	25
2004/05	54
2005/06	69
2006/07	81
2007/08	92
2008/09	102
2009/10	102
2010/11	102
2011/12	102

Forecasts Compared to Weather Adjusted Actuals



* Closure of Gold River mill (about 90 MW) in 1994 not included in the 1992 Forecast.

Vancouver Island Forecast



Vancouver Island Existing & Committed Supply

Sources of Dependable Capacity for Vancouver Island (2006/07 without VIGP)

On the Mainland

✦ 500 kV AC Transmission*	1,300 MW
✦ HVDC (expected retirement in 2007)	240 MW

On Vancouver Island

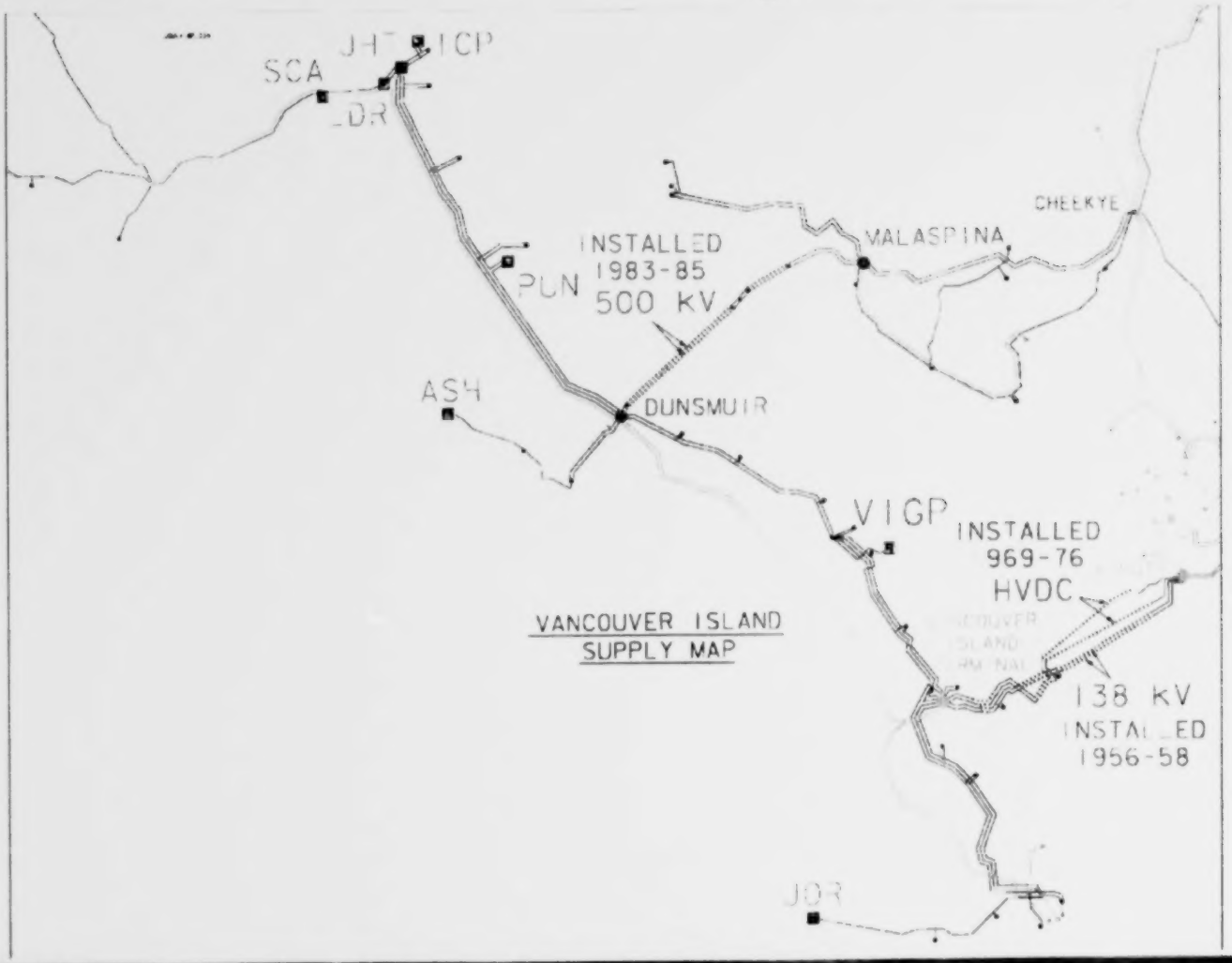
✦ Island Cogen Project	240 MW
✦ Existing Island Hydroelectric	450 MW
✦ Green and Customer Generation	25 MW
Total Supply	**2,255 MW**

*One of two 500 kV circuits not available for single contingency reliability planning

Sources of Dependable Capacity for Vancouver Island

- About 30% of Vancouver Island peak electricity is produced on Vancouver Island
- The remaining 70% is delivered through submarine cables from the mainland

Vancouver Island System Map



Firm Transmission

- Two 500kV AC circuits* — 1,300 MW
- High Voltage Direct Current System — 240 MW
  - Until expected retirement in 2007
  - De-rated to 168 MW due to cable failures
- Two 138kV AC Circuits — 0 MW
  - De-rated due to age and condition

* With one circuit out of service to meet the single contingency reliability planning criteria

Island Co-generation Project

- Located at the Elk Falls in Campbell River
- Designed for 240 MW
  - Derated until 2005/06

Existing On-island Hydroelectric - 450 MW Dependable Capacity

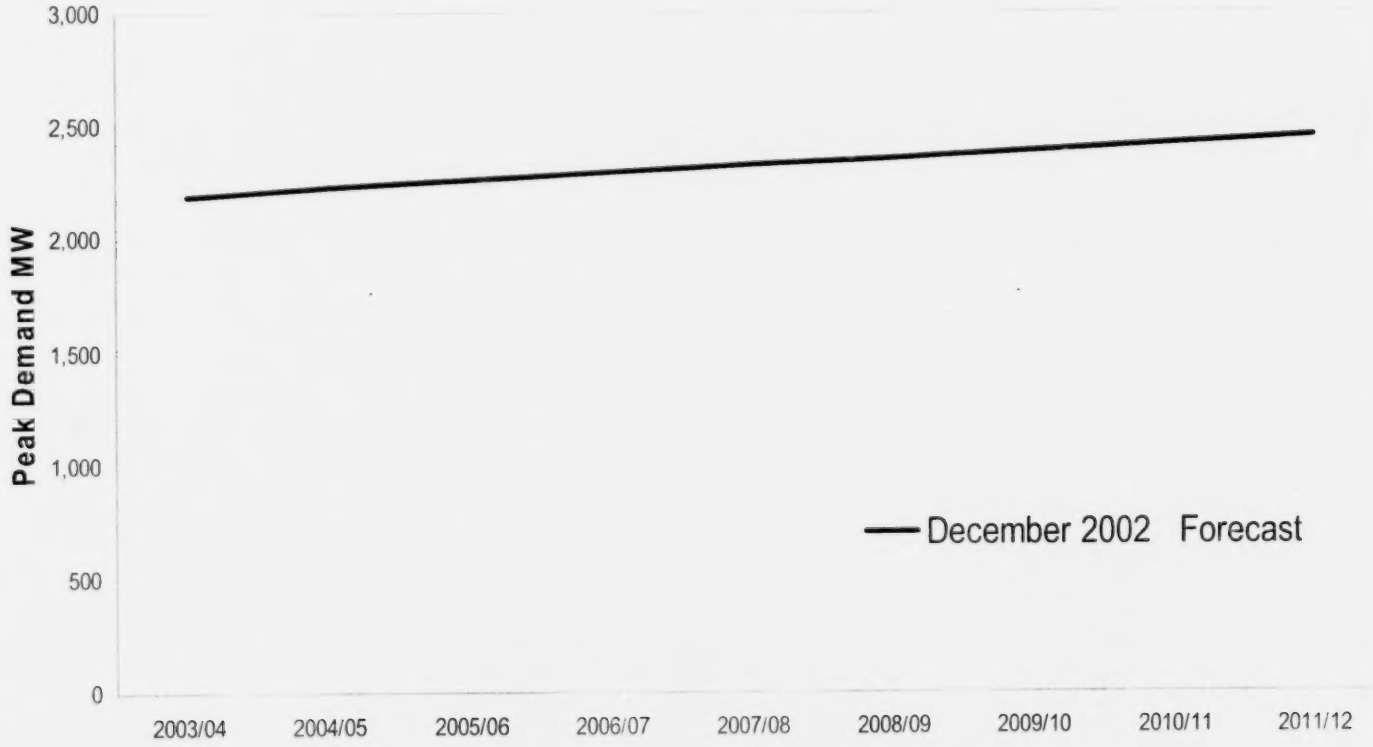
Ash River	27 MW
Jordan	170 MW
Puntledge	18 MW
Strathcona	60 MW
Ladore	48 MW
John Hart	126 MW
Doran Taylor IPP	2 MW
Total Hydro	**450 MW (rounded)**

Green and Customer Generation

- 25 MW of dependable capacity expected from new green and customer generation
  - Five remaining projects from the customer generation announced on April 14 - none on the Island
  - 25 MW still a reasonable estimate given results of 2000 green call and 2002 green call short list
  - Starts coming on-line in 2005 from 2000 call
  - Next step in 2002 green call impacts if 25 MW is achieved

Conclusions

Vancouver Island Forecast Peak Demand for Electricity



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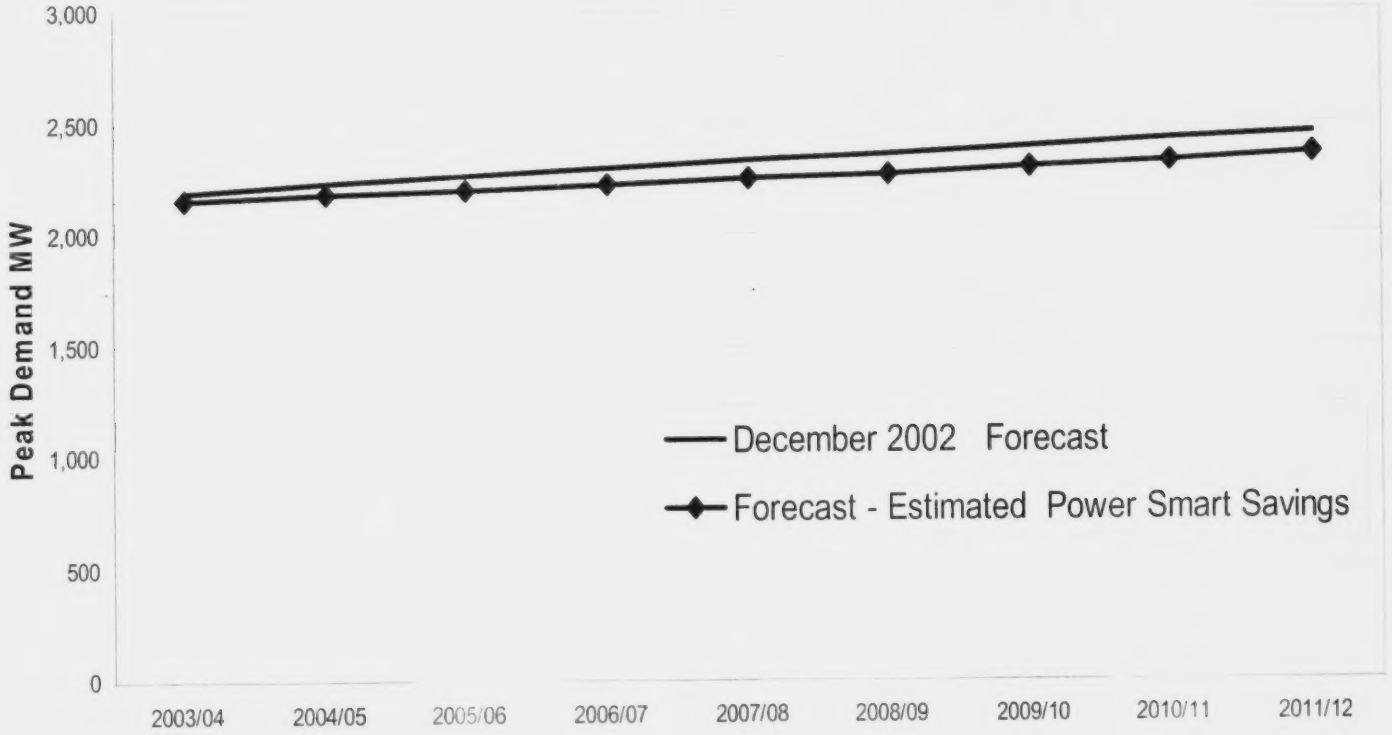
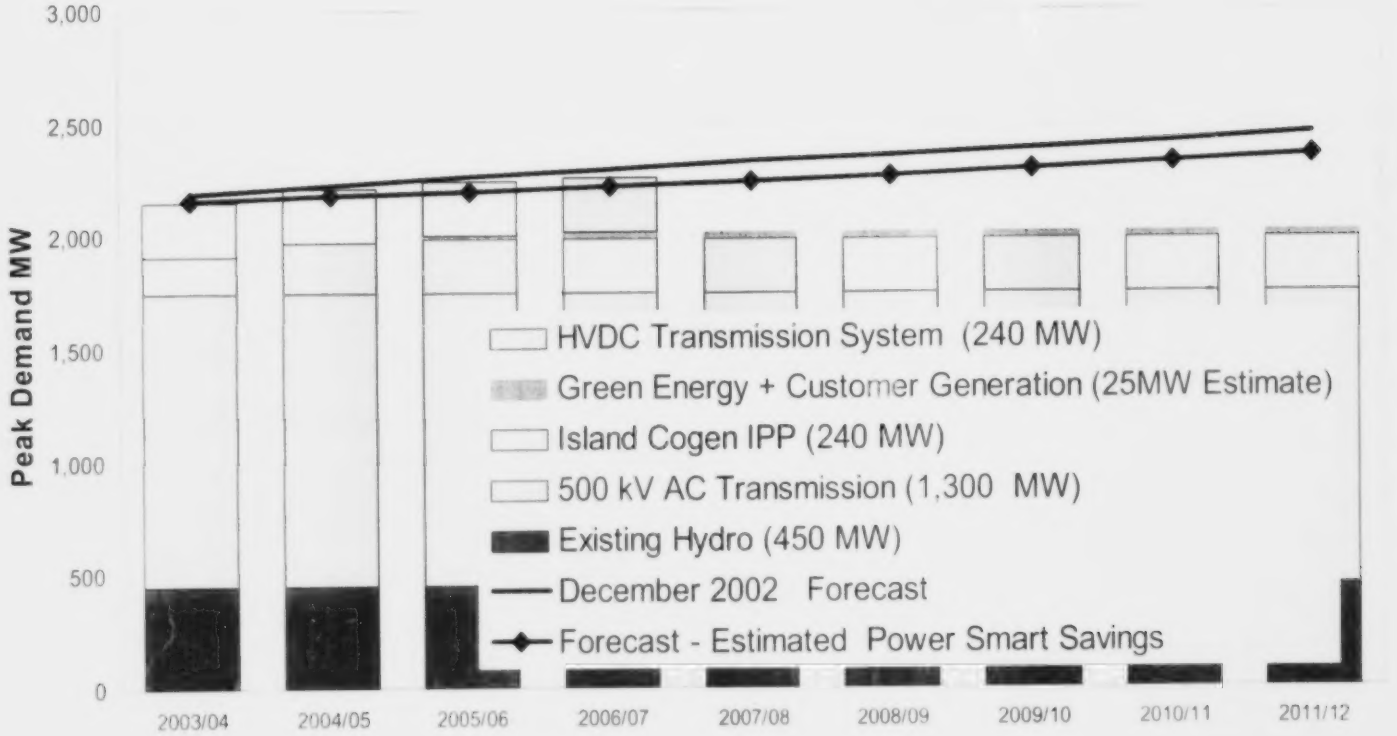


Vancouver Island Dependable Capacity



Conclusions

- New resources to meet peak demand on Vancouver Island are required due to the expected retirement of the High Voltage Direct Current System in 2007 and forecast increases in demand

Vancouver Island Dependable Capacity/Peak Demand Balance (Megawatts)

	2003/04	2004/05	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12
Peak Demand (in megawatts)									
December 2002 Load Forecast (includes transmission losses)	2189	2230	2263	2293	2320	2346	2377	2406	2438
Estimated Power Smart Peak Reductions	25	54	69	81	92	102	102	102	102
Peak Demand with Power Smart Reductions	**2164**	**2176**	**2194**	**2212**	**2228**	**2244**	**2275**	**2304**	**2336**
Firm Supply Capacity (existing)									
500 kV Transmission System	1300	1300	1300	1300	1300	1300	1300	1300	1300
HVDC Transmission System	240	240	240	240	0	0	0	0	0
Island Cogeneration Project	164	220	240	240	240	240	240	240	240
Existing VI Hydro Generation	450	450	450	450	450	450	450	450	450
Allowance for Green Energy+ Customer Based Generation	0	0	0	25	25	25	25	25	25
Total Supply Capacity	**2154**	**2210**	**2230**	**2255**	**2015**	**2015**	**2015**	**2015**	**2015**
Supply/Demand Balance with Power Smart	(10)	34	36	43	(213)	(229)	(260)	(289)	(321)
Supply/Demand Balance Before Power Smart	(35)	(20)	(33)	(38)	(305)	(331)	(362)	(391)	(423)

Panel Members

Jeff Barker - Responsible for Energy Management which includes the planning and acquisition of resources to meet the demand for electricity.

Henry Mak -Responsible for the market forecasting group.

Richard Marchant - Responsible for customer care and the marketing, delivery and quality assurance of Power Smart programs for BC Hydro's domestic customers.

Ron Monk -. Responsible for the electricity planning group.

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Jeff Barker - Responsible for Energy Management which includes the planning and acquisition of resources to meet the demand for electricity. Graduated from the University of Toronto with degree in Civil Engineering (B.A.Sc.) and from SFU with Master of Business Administration (MBA). Registered member of the Association of Professional Engineers and Geoscientists of BC (P.Eng.).

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